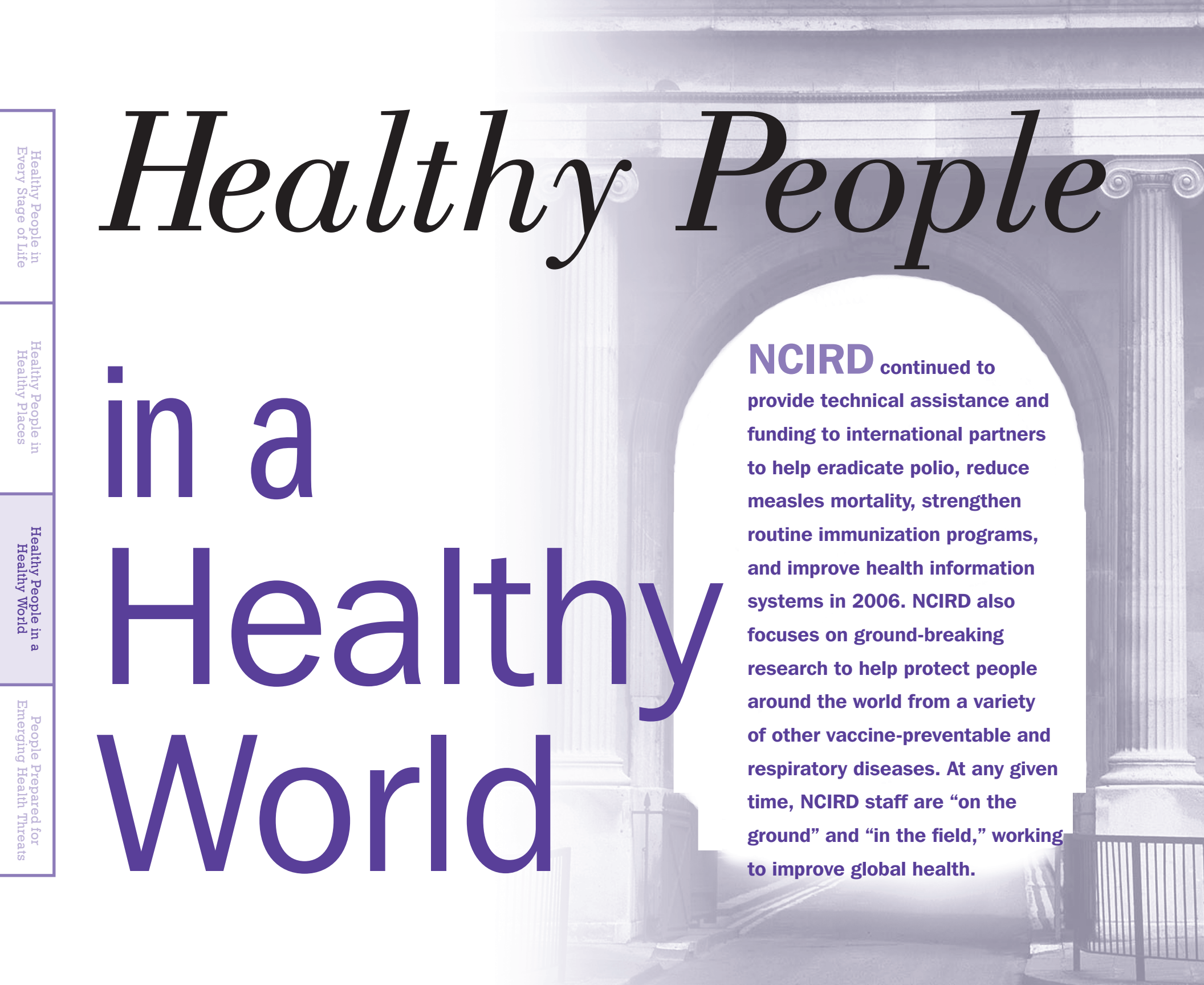
Healthy People

in a Healthy World



NCIRD continued to provide technical assistance and funding to international partners to help eradicate polio, reduce measles mortality, strengthen routine immunization programs, and improve health information systems in 2006. NCIRD also focuses on ground-breaking research to help protect people around the world from a variety of other vaccine-preventable and respiratory diseases. At any given time, NCIRD staff are "on the ground" and "in the field," working to improve global health.

Global goal to cut measles deaths *surpassed*

Early in this century, the United Nations set an ambitious public health goal: to cut global measles deaths in half by 2005, compared with 1999 levels. In the 1999 baseline year, measles killed an estimated 873,000 people, the vast majority being young children in developing countries. Measles mortality data for 2005, published in 2006, revealed that measles deaths had fallen to 345,000, a drop of 60%. Thus, the global goal was not just achieved, but surpassed. During the period from 1999 to 2005, large-scale measles vaccination campaigns and improvements in routine immunization services prevented an estimated 2.3 million measles deaths. The success in meeting this 2005 goal has led to a new goal: to cut global measles deaths by 90% by 2010, compared with mortality levels in 2000.

Much of the success for the reduction in measles deaths is due to the support of the Measles Initiative and the commitment of governments of countries with large measles burdens, particularly in Africa. CDC is a founding member of the Measles Initiative—along with WHO, UNICEF, the American Red Cross, and the United Nations Foundation. During its first five years (2001–2005), the Initiative was the main international supporter of large-scale measles immunization campaigns in more than 40 countries, leading to the vaccination of more than 360 million children. Through the Initiative, CDC provides technical expertise to host governments to help them plan, implement, and evaluate immunization programs, including operations research. Additionally, CDC provides funds to purchase measles vaccine for mass vaccination campaigns.

Photos by Steve Stewart

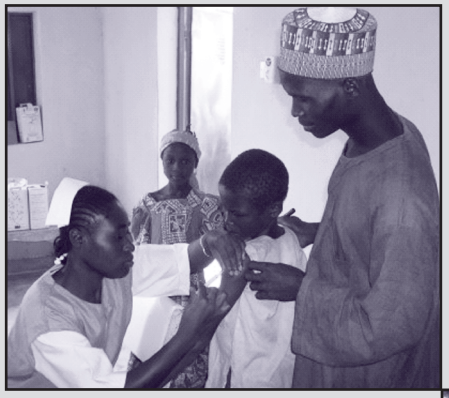
SCENES FROM SIERRA LEONE, NIGERIA, AND MALAYSIA
Families line up to receive measles vaccinations with the help of local workers.

Measles mortality data for 2005, published in 2006, revealed that measles deaths had fallen to 345,000, a drop of 60%.

For more information about the Measles Initiative, visit www.measlesinitiative.org

Photo by Judy Schmidt

WAITING FOR VACCINATION
Gimbie School, Ethiopia.



Measles is the leading cause of vaccine-preventable death among children, yet it can be easily prevented with a simple vaccination.

Photos by Paul Chenoweth

MEASLES VACCINATIONS
Campaign in Nigeria.

Helping countries "move out" measles

While most Americans barely remember measles, this disease kills thousands of children worldwide annually, with an estimated 114,000 children under age five dying in Africa alone.

Measles is the leading cause of vaccine-preventable death among children, yet it can be easily prevented with a simple vaccination. In 2006, the Measles Initiative expanded to provide technical assistance and financial support for measles SIAs (supplemental immunization activities) outside of Africa—in Bangladesh and Indonesia, where a total of 65 million children were targeted for vaccination.

During 2006, CDC supported measles mortality reduction in the African Region (AFRO): Angola, Burundi, Democratic Republic of the Congo, Ethiopia, Ghana, Guinea Bissau, Guinea (Conakry), Kenya, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, Swaziland, Uganda and Zimbabwe; the Eastern Mediterranean Region (EMRO): Egypt, North and South Sudan, Pakistan, and Somalia; the Southeast Asia Region (SEARO): India, Bangladesh, Bhutan, and Indonesia; and the Western Pacific Region (WPRO): China, Laos, Cambodia, Pacific Island Countries, and Philippines. In addition, CDC supported regional measles elimination activities in the Region of the Americas (PAHO): Argentina, Columbia, Guatemala, Mexico, Peru, Bolivia, Paraguay and Haiti; and the European Region (EURO): Azerbaijan, Kazakhstan, Kyrgyzstan, Romania, Tajikistan, and Turkey. In fiscal year 2006, CDC contributed nearly $42 million in grants and other scientific and technical assistance to control measles globally.

The global measles team provided technical assistance for evaluation of the Reaching Every District strategy in Sudan and several countries in AFRO, and developed a plan to evaluate the AFRO data management system. The team also worked with partners on operations research projects to test strategies for improving routine immunization in India, Kenya, and Burkina Faso. The Kenya and Burkina Faso projects have shown significant increases in routine immunization coverage in the intervention districts. For example, 5,000 more children were vaccinated against measles per year in the three pilot districts in Kenya than in years prior to the intervention, an increase of 54.1%. In Burkina Faso, there was a 21% increase in the number of children vaccinated against measles in the three pilot districts. Preliminary results in India indicate a similar increase of more than 30%. The improved coverage is attributed to supportive supervision and to the use of data for program planning and program feedback. These countries plan to expand these strategies to improve routine coverage and to enhance programs nationwide.

Global collaborations

promote world health

Thousands of pregnant "moms" in South Africa recruited for "PoPS"

Neonatal sepsis is one of the most common causes of perinatal mortality in developing countries. The high prevalence of HIV infection among women of childbearing age in many developing countries may contribute to an increased incidence of neonatal sepsis in HIV-exposed infants. In the US and other developed countries, giving IV antibiotics during labor and delivery has been effective at preventing some forms of neonatal and maternal infections.

However, this intervention is neither practical nor feasible to implement in many developing country settings where disease burden is greatest, and it does not protect against viral and several bacterial pathogens that can be transmitted from mother to child during labor and delivery. In addition, it could contribute to the emergence of or selection for antimicrobial resistant strains of bacteria.

The Prevention of Perinatal Sepsis (PoPS) study is a randomized, placebo-controlled clinical trial to study the efficacy of chlorhexidine (disinfecting) wipes of the birth canal during labor and of the infant at birth. The study is designed to see if the wipes are effective in reducing:

- early-onset neonatal sepsis;
- transmission from mother to child of several bacteria during labor and delivery; and,
- maternal "childbirth fever" infection among HIV-infected and HIV-uninfected pregnant women in Soweto, South Africa.

The study is also designed to look at the prevalence of vaginal colonization by bacteria commonly associated with neonatal sepsis and maternal peripartum (childbirth) infection, and to characterize the burden of disease and risk factors for maternal peripartum infection and serious neonatal infections in the study population, using active microbiological surveillance. More than 6,000 pregnant mothers required for the full study have been recruited to date.

HOPE FOR A HEALTHY START
Mothers in South Africa.

Photo by Steve Stewart

SHORT "OUCH," LONG PROTECTION
Vaccination in Malaysia.

FOR MOST VACCINE-PREVENTABLE diseases, no country is ever truly free of a disease until all countries are free. Working together, the countries of the world wiped smallpox off the face of the earth. NCIRD continues to work with partners to help protect persons in every country from vaccine-preventable diseases. At least two million people in all age groups die every year globally from diseases preventable by vaccines recommended by the World Health Organization (WHO).

In 2006, CDC continued to provide technical assistance and funding to international partners to help eradicate polio, to reduce measles mortality, to strengthen routine immunization programs, and to improve health information systems and use of data. In addition, NCIRD collaborated with both WHO and the United Nations Children's Fund (UNICEF) in the development of their joint worldwide plan for immunization through 2015, the "Global Immunization Vision and Strategies" (GIVS).

Working with other Centers at CDC, NCIRD drafted the "CDC Global Immunization Strategic Framework, 2006–2010." The framework articulates CDC's goals, objectives, and strategies for global immunization for this 5-year period. It also describes CDC's roles and contributions toward achieving each of the objectives.

Polio eradication efforts continue worldwide

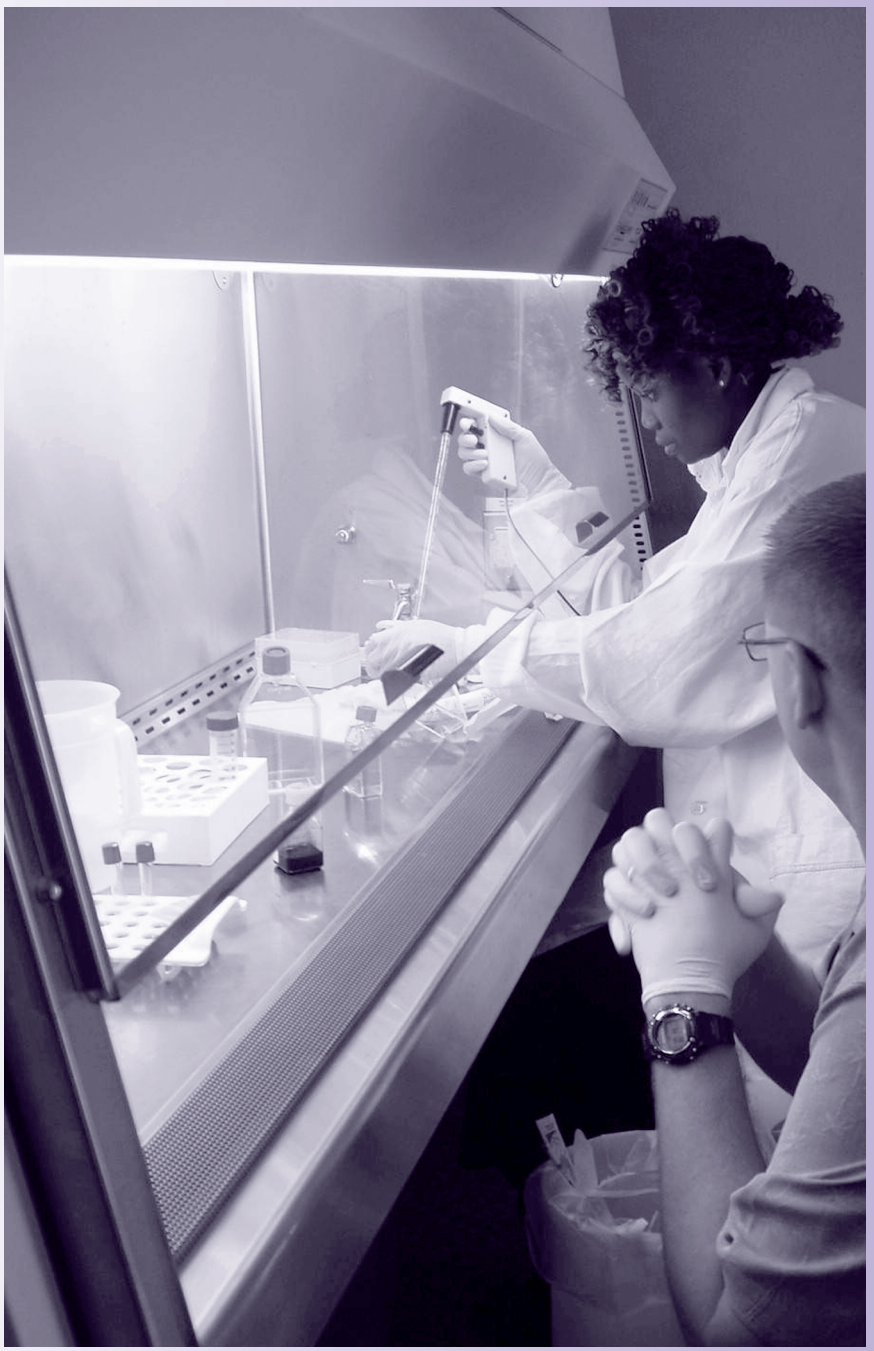
Photos courtesy of A.J. Williams

When the World Health Assembly resolved in 1988 to eradicate poliomyelitis globally, there were 125 polio endemic countries and more than 350,000 polio cases annually. CDC/NCIRD is a major partner in the Global Polio Eradication Initiative (GPEI), the largest public health effort to date, which has prevented more than five million disabilities from polio worldwide and has contributed to a more than 99% reduction in total global polio cases. The most important contribution of NCIRD to polio eradication continues to be deployment of its epidemiologists, public health experts, and scientists to WHO and UNICEF. In addition, a number of international and national staff in WHO and UNICEF headquarters, regional, and country offices are funded by CDC cooperative agreements to the two UN agencies.

CDC also provides funding for oral polio vaccine required for international mass immunization campaigns, as well as a wide range of technical expertise and laboratory support for the polio eradication initiative. CDC works as the "viral detective" of the four partners, using its state-of-the-art virological surveillance expertise (genetic fingerprinting) to identify the strain of poliovirus involved and pinpoint its exact geographical origin.

Finally, CDC conducts research that will facilitate development of post-certification immunization and surveillance policies. As of 2006, only four endemic countries remain: Afghanistan, Pakistan, India, and Nigeria, while Somalia, Angola, Ethiopia, Democratic Republic of Congo, and Bangladesh remain the biggest risks in non-endemic countries.

In 2006, 1,902 confirmed cases of paralytic polio were reported, compared with 1,802 cases in 2005. However, polio cases in the four endemic countries rose from 42% of the global cases in 2005, to 93% of the global cases in 2006. By contrast, polio cases due to importations in non-endemic countries dropped from 58% in 2005 to 7% of the cases in 2006. Controlling polio outbreaks in non-endemic countries in 2006 was successful, while there was an increase in cases in endemic countries.



TECHNICAL ASSISTANCE
Nigerian laboratory.

NCIRD laboratory has key role in expanding contributions of the Global Polio Laboratory Network

The Global Polio Laboratory Network (GPLN) plays a central role in poliovirus surveillance for the WHO GPEI and serves all countries of the world. CDC provides assistance in the development and monitoring of the 145 members of the GPLN, including funding short-term and long-term technical support in key countries.

All wild polioviruses detected worldwide are characterized by GPLN laboratories (including at CDC), and the sequence data are used to address key surveillance questions. Phylogenetic trees and maps of circulating poliovirus lineages are distributed monthly by CDC, and the information is used by national governments and WHO to better target immunization activities.

Molecular epidemiologic data were used to track the spread during 2003–2006 of wild poliovirus from northern Nigeria to 20 other countries; from Guinea in the west to Indonesia at the southeastern rim of Asia; and from northern India to six other countries, including three in southwestern Africa. Polio was rolled back in most re-infected countries, and intensified immunization activities were launched in the source reservoirs. In addition to wild polioviruses, the GPLN was able to detect five outbreaks of vaccine-derived polioviruses (VDPV) since 2005, including in the US, that have been subsequently controlled.

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Collaboration and compliance in NCIRD laboratories

Collaboration with Thailand leads to advances in diagnostics and understanding of global disease burden

To facilitate efforts to understand new viral pathogens, NCIRD collaborated with the Thailand International Emerging Infections Program (IEIP), a collaboration between CDC and the Thailand Ministry of Health. The Thai IEIP has an ongoing pneumonia etiology study that enrolls hospitalized pneumonia patients identified through population-based surveillance and collects respiratory and blood specimens. The collaboration with Thailand promises to improve our understanding of respiratory viral pathogens in Asia.

The collaboration with Thailand promises to improve our understanding of respiratory viral pathogens in Asia

During 2006, the CDC/Thailand collaboration:

- made **sensitive and specific diagnostic assays** for well-recognized respiratory viruses and viruses that were only recently described in 2004 and 2005, including new human coronaviruses and human bocavirus;
- demonstrated that **one newly identified virus, human bocavirus**, was epidemiologically associated with hospitalized pneumonia; the incidence of bocavirus disease in children was similar to other respiratory viruses, such as respiratory syncytial virus (RSV);
- assisted in training Thai scientists who will be able to perform these new molecular assays and then be able to **rapidly identify new pathogens during outbreaks**.

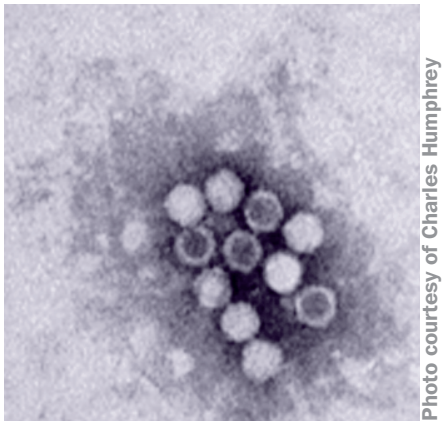

Photo courtesy of Charles Humphrey

NEW PATHOGEN
Bocavirus.

COLLABORATION KEY
Thai IEIP and CDC staff.

Quality Management System to monitor meningococcal vaccine clinical trials in Africa

A quality management system (QMS) provides a greater sense of confidence in knowing that a company or an agency is following appropriate guidelines and rules for the production of devices and/or drugs.

One such QMS in use at CDC is an integral part of the Meningococcal Vaccine Laboratory (MVL) and its work with clinical trials in Africa. MVL is working with the WHO and Program for Appropriate Technology in Health (PATH) to conduct phase I, II, and III clinical trials of a meningococcal group A conjugate vaccine. The trials are part of the Meningitis Vaccine Project (MVP), which is accelerating development of the new vaccine for use in Africa's Menigitis Belt.

Recognized as the benchmark for management of quality in the industry, QMS is the key to providing sound scientific results. Such a system is an integral part of planning and conducting research, and recording, reporting, and applying results to improve overall efficiency, enhance status, and increase quality of testing operations. QMS includes the organizational structure, responsibilities, procedures, processes, and resources for implementing quality management and ensures that facilities, equipment, personnel, methods, practices, records, and controls are in compliance with required regulations.

An effectively operated system should result in continual improvement in the level of quality service and products.

QMS is the key to providing sound scientific results

CDC embraces these high regulatory standards to assure the quality and integrity of data submitted to regulatory authorities.

Although CDC has not had a mandate to establish a QMS in the past, this is changing. The development of an independent QMS is the minimum regulatory requirement to ensure the validity of test results in support of, for example, vaccine licensure. MVL is one of the few laboratories at CDC working at this compliance level.

REVIEWING RESULTS
Cyndy Pleatman and Jordan Theodore in the Meningitis laboratory.

The GAVI/Hib Initiative

taking action to prevent childhood pneumonia and meningitis

IN 2006, NCIRD CONTINUED TO collaborate with the Global Alliance for Vaccines and Immunization (GAVI) and Hib Initiative. The Hib Initiative's mission is to support evidence-informed decisions at the global, regional, and country levels in the use of Hib vaccination to prevent childhood meningitis and pneumonia.

This GAVI-funded initiative is a collaboration of the Johns Hopkins Bloomberg School of Public Health, the London School of Hygiene and Tropical Medicine, CDC, and WHO. The Hib Initiative builds on ongoing activities that are relevant to Hib disease in the eligible countries and works collaboratively with various partners to achieve the initiative's goal of reducing death and disability caused by meningitis and pneumonia.

In early 2006, the Hib Initiative met in Geneva to review the evolving environment of Hib immunization. This includes new funding opportunities through GAVI, an evolving vaccine supply, and the new recommendation from the Strategic Advisory Group of Experts (SAGE).

The Hib Initiative developed its strategic plan in collaboration with GAVI partners, available at www.hibaction.org. The plan focuses on three main strategic directions: communication, coordination, and research, and will focus its priorities by geographic areas with different levels of vaccine implementation.

VELLORE
India Hib study site visit, July, 2006 (primary healthcare center).

KOLKATA
India Hib study site visit, July, 2006.

NAIROBI
Anglophone AFRO forum, June, 2006.

Can a new vaccine prevent epidemics in the "meningitis belt"?

IN THE AFRICAN "MENINGITIS BELT," a region that extends from Ethiopia in the east to Senegal in the west, serogroup A meningococcal disease has posed a recurrent threat to public health for at least 100 years. Rates of meningococcal disease are several times higher in this region than in industrialized countries. At approximately 10%, the reported mortality rate is similar; however, because many patients die before reaching a hospital, the true mortality in the meningitis belt is probably substantially higher. In addition, outbreaks occur every eight to twelve years, frequently resulting in attack rates of 500 to 1,000 cases per 100,000 people. Although rapid detection and early response to epidemics can reduce illness and deaths through prompt vaccination campaigns, the region is not adequately prepared to implement comprehensive control efforts.

NCIRD is helping to develop a new vaccine to prevent epidemics of meningococcal group A disease in sub-Saharan Africa. Most meningitis cases in Africa are caused by what is known as serogroup A, which is no longer seen in the US. In other parts of the world, other serogroups, such as B and C, are more common. Known as a meningococcal A conjugate vaccine, the new vaccine will be targeted to combat meningitis, including epidemics of meningitis. Conjugate vaccines produce immune responses in children less than two years old and provide long-term protection. Current polysaccharide vaccines do not produce good immune responses in children and do not provide long-term protection. Conjugate vaccines also interrupt transmission.

NCIRD is helping to develop a new vaccine to prevent epidemics of meningococcal group A disease in sub-Saharan Africa

The vaccine is being developed by the Meningitis Vaccine Project (MVP) of the Program for Appropriate Technology in Health (PATH) and the WHO. PATH is an international, nonprofit organization which works with public and private partners to improve the health of people around the world. MVP was created in 2001 through a $70 million, ten-year grant from the Bill and Melinda Gates Foundation. The MVP partnership has collaborators from around the world.

PATH chose CDC and the Health Protection Agency (HPA) in the United Kingdom to develop, validate, and perform immunologic assays (research about the biological potency of the vaccine). The assays evaluate vaccine-specific immune antibody responses caused by the vaccine.

Six to eight clinical studies are planned in Africa and India from approximately November 2005 to mid-to-late 2009. Phase I has been completed. By the studies' completion in 2009, an estimated enrollment of more than 7,000 study participants is expected. Phases I, II, and III studies will be primarily conducted in Africa. The Meningococcal Vaccine Laboratory (MVL) at CDC will test serum from about 3,000 participants. The goal for these studies is to provide an effective and affordable vaccine that will be licensed in India and affected countries of Africa.

Photo courtesy Nancy Rosenstein Messonnier